U.S. Environmental Protection Agency
Central Data Exchange

Office of Solid Waste
RCRA Hazardous Waste

e-Manifest Roadmap
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Executive Summary

For more than 20 years, the hazardous waste manifest system has relied on the creation of a paper trail to track hazardous waste shipments from cradle-to-grave. Waste generators create multicopy manifest forms to show the transportation routing of their waste shipments and the composition and quantity of the materials being shipped. Each handler signs the manifest by hand, until it is signed by the final waste management facility to show the waste shipment was received. Copies signed by all parties are retained in company files, and the final copy verifying receipt by the treatment, storage and disposal facility (TSDF) is mailed back to the generator to close the tracking loop. About 28 states also collect manifests from generators and TSDFs, and the data are manually keyed into state tracking databases to help oversee waste management trends and assess fees.

Because of the volume of manifests circulated each year (more than 2.5 million) and the number of copies that must be signed sequentially and retained in files for inspection, the manifest system produces some of the largest paperwork burdens in the U.S. Environmental Agency (EPA). Compliance with the manifest system costs waste handlers and states more than $193 million annually. For this reason, EPA has been pursuing for several years a project that would transition the manifest from a paper-based system to an electronic approach. The EPA Office of Solid Waste (OSW) proposed standards for automating the manifest in May 2001 and conducted a stakeholder conference in Washington, D.C., on May 19-20, 2004, to continue the progress toward finalizing an e-Manifest approach.

Conference Objectives

Objectives of the stakeholder conference follow:

- Present and receive stakeholder input on the OSW's working draft of the Resource Conservation and Recovery Act (RCRA) Hazardous Waste e-Manifest Roadmap.
- Understand lessons learned from other types of e-Manifesting projects.
- In conference breakout groups, identify and work through issues associated with creating a successful e-Manifest approach, including balancing consistency with flexibility, ensuring system security and usability, and addressing cost and funding.
- Describe streamlining and other core clearing and ancillary business opportunities that might be created by a national RCRA e-Manifest system.

Key Areas of Convergence

The stakeholder meeting was well attended by the waste generator sector, waste management sector, other federal agencies, the IT community, and several authorized states. Much opinion converged on the desire for a consistent national framework for transmitting and maintaining e-Manifests, and the user community indicated a willingness to pay user fees or other transactional service fees to develop and maintain an e-Manifest system. Much work still must be done to iron out the fine points for developing and implementing any federally or privately hosted e-Manifest approach. A comprehensive list of the key areas of convergence from the conference follows:

- **A high degree of stakeholder support exists for an e-Manifest system.** Conference participants agreed that an e-Manifest system is "doable" and desirable. Key drivers behind an e-Manifest system include reducing the paperwork burden, thereby

increasing cost savings and efficiency; improving initial data quality; and having the ability to correct manifest data more easily and quickly.

- **e-Manifest will, and should, be optional.** Because generators can choose to continue to use paper manifests, design of any electronic system must acknowledge that some use of paper manifests will continue into the future.
- The uniform manifest form rule should be finalized quickly by EPA and the Office of Management and Budget (OMB).
- **An e-Manifest system should use centralized systems for certain "key" functions.** Two functions were identified and discussed at length: Manifest clearing/processing (temporarily named *FOO* to facilitate verbal reference to this approach during the conference) and official governmental acceptance and reposting of manifests, as depicted in Figure ES-1 below:

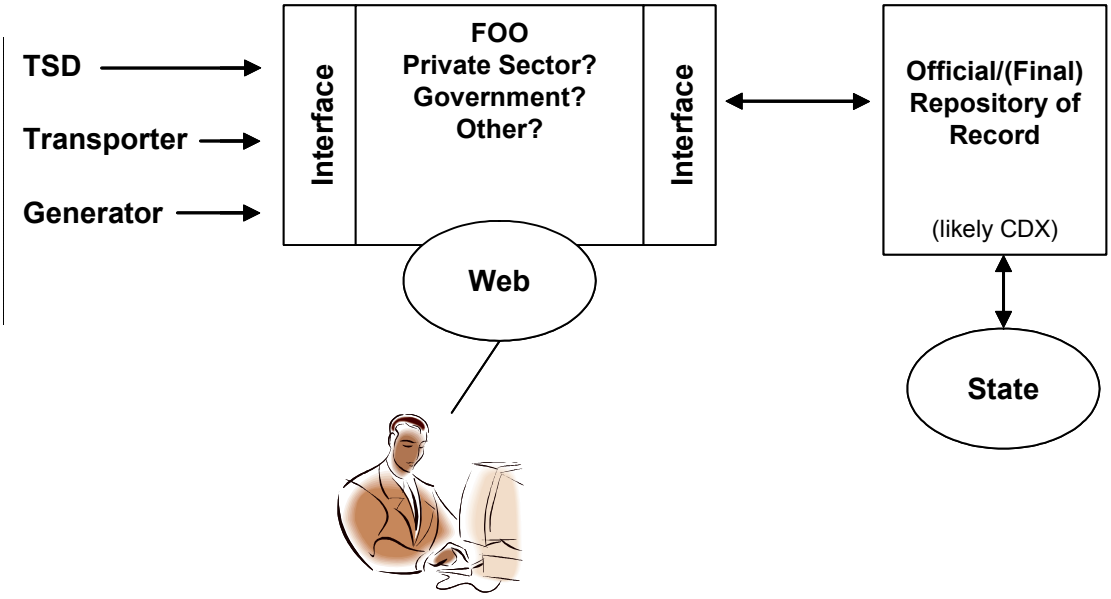


Figure ES-1. FOO Approach

- The group favored an approach where the e-Manifest interface (FOO in the diagram above) might be designed, funded, and operated by a private consortium or consortia in consultation with government (government determines what constitutes a valid manifest transaction, performance standards for components, and auditing requirements), and the repository might be designed, funded, and operated by government, potentially using EPA's Central Data Exchange (CDX). This framework can be implemented in numerous ways, with many design options, many funding options, and many options for who would build and govern FOO and how it would interact with both state and federal governments.
- A central service provider, whether government or private, or a combination, must be reliable and trusted if an e-Manifest system is to be successful.
- Some minimum key functions are necessary for an e-Manifest system to provide a viable alternative to paper manifests. These functions were agreed upon as follows:
  - Get a registered manifest with a unique identification number.
  - Fill in needed data, potentially accessing existing systems to verify and correct data, such as facility identification numbers.

  - Sign/certify manifests for generators and receiving facilities.
  - ♦ Change/correct manifests in an auditable (traceable) fashion.
  - ♦ Identify/record waste shipment discrepancies on the manifest.
  - ♦ Store and provide access to manifest data, including secure copies of all manifest "pages."
- **An e-Manifesting system has to work for everyone.** The group discussed a number of key customers and their requirements for an e-Manifest system:
  - All current stakeholders with "big legacy IT systems"
  - Solution providers
  - State agencies
  - RCRA regulatory compliance and enforcement personnel
  - Generators, transporters, and TSDFs that have real-world daily business operational imperatives
- **Any e-Manifest system must successfully address issues associated with data and signature security.** This includes the ability to ensure data integrity over time, provide for an audit trail to document tracking of any changes to an e-Manifest, and show who made the changes and when (traceability).
- Just as there is a paperwork burden cost associated with the paper manifest system, there will be a cost associated with an e-Manifest system. The group did not universally support "user fees," but participants did converge around the idea of appropriate "fees for services."
- All of the funding options discussed, and combinations of these options, could have a role in creating a successful e-Manifest system.

Issues Remaining To Be Addressed

In addition to the areas of convergence related to the design, operation, and funding of an e-Manifest system, stakeholders identified a number of remaining issues that require additional thought or research as part of moving forward with e-Manifest.

- The extent to which an e-Manifest system should also address the Toxic Substances Control Act (TSCA) and other wastes that have similar shipping requirements.
- The need to coordinate with the Customs Service and with the Department of Transportation (DOT) in any e-Manifest project.
- The need to resolve the way transporters and small entities (SQGs) might participate in an e-Manifest system and to clarify the relationship between e-Manifest and DOT shipping requirements. One approach the group discussed was that generators and receiving facilities might create and sign/certify a manifest electronically, but that a paper copy of this electronic document would be printed for use by transporters and fulfillment of DOT shipping requirements.
- The need to deal with issues that may be associated with bulk shipments and transfer facilities and other potential complexities associated with individual waste shipments.

Possible Next Steps

Stakeholders identified a number of possible next steps to further the e-Manifest concept.

- Develop a more detailed description of the required key functions. This product should focus on *what* a successful e-Manifest system must do (system functionality), rather than on *who* should build or operate it. These descriptions would also allow for creation of cost estimates and business case. This more detailed system description should be developed in further consultation with stakeholders.
- Continue to build a coalition of stakeholders to support e-Manifest and resolve the issues identified above. This should include providing additional information about e-Manifest options to a wider cross-section of stakeholders, including all state environmental agencies not represented at the conference.
- Generate cost estimates to support development of an OMB Circular A-11 business case and for a funding analysis. This should include additional exploration of implications of a share-in-savings funding option for all stakeholders and exploration of the costs of updates and maintenance for various e-Manifest approaches.
- Design and implement an e-Manifest system that includes a partial initial phase-in, as appropriate, developed by system designers.

Conference Wrap Up

OSW e-Manifest Project Leader R. LaShier wrapped up the conference activities. In particular, he recognized the broad stakeholder support for e-Manifest and the opportunities it provides, support for a centralized system to provide core manifest services or functionality, and identification of a potential "hybrid" option.

He assured participants that EPA management will be briefed on the results of the conference and options for proceeding with the *e-Manifest Roadmap* in July 2004.

Over the summer, EPA will continue to work with the stakeholders to develop ideas about e-Manifest and identify the regulatory steps in moving forward. It is anticipated that these steps will include a review of the 2001 e-Manifest proposal to determine whether a supplemental notice of data availability (NODA) should be issued to provide for additional stakeholder input on the e-Manifest concept. In September 2004, EPA will make budget decisions about its FY05 activities for e-Manifest. He also indicated that proceedings of the e-Manifest conference, including copies of all presentations, would be made available and posted on the e-Manifest conference Web site (www.epa.gov/epaoswer/hazwaste/gener/manifest/e-man.htm).

OSW (R. LaShier) emphasized that stakeholder participation would continue to be very important in helping the Agency develop a successful, fundable approach to e-Manifest. If stakeholders could continue to come together, as they did during this conference, around a broadly shared vision for a national e-Manifest system and a feasible funding approach, the Agency will likely be able to move expeditiously forward. He encouraged participants to stay involved in the e-Manifest project, and asked all to continue to work with EPA to make e-Manifest a near-term reality.

Section 1. Day One—May 19, 2004

1.1 Opening Plenary: Welcome and Orientation

The U.S. Environmental Protection Agency (EPA) Office of Solid Waste (OSW) Deputy Director M. Hale welcomed participants to Washington, D.C., for the conference (http://www.epa.gov/epaoswer/hazwaste/gener/manifest/e-man.htm) and emphasized EPA's interest in a successful, implementable, and affordable e-Manifest system. He explained some background of EPA's e-Manifest work to date. In May 2001, the Agency published an e-Manifest proposal that suggested a very decentralized approach (http://www.epa.gov/epaoswer/hazwaste/gener/manifest/mods.htm). Under this proposed approach, EPA's role was not unlike its role with respect to the current Resource Conservation and Recovery Act (RCRA) paper manifest form (EPA Form 8700-22). The Agency proposed that EPA would only issue manifest data and information technology (IT) standards, and private industry had the option of building decentralized systems. EPA received numerous comments on the proposed approach, including many comments indicating that private industry had limited, if any, interest or incentive to build multiple, disparate e-Manifest systems, and that EPA should consider a more centralized approach or system.

In response to these comments, EPA conducted further cost/benefit analyses on e-Manifest. The analyses showed that waste handlers and states would realize substantial paperwork burden cost savings ($1 billion over 10 years) if an e-Manifest capability were deployed; and both commercial and government sectors could realize benefits and services not currently available with the paper manifest system. However, the study also confirmed that the costs of developing and maintaining a national system were large. The Office of Solid Waste (OSW) (M. Hale) emphasized that success of the e-Manifest work would depend, at least in part, on identifying an affordable funding approach.

OSW (M. Hale) also updated participants on the status of OSW's proposed regulatory revisions to create a truly "Uniform Manifest" form. The rule is in final review with EPA and should go to the Office of Management and Budget (OMB) for their review later this summer. After OMB review, a final rule will be published in late summer or fall. The standard data elements implemented by the new uniform manifest form are an important step on the path toward a successful national RCRA e-Manifest implementation.

EPA Office of Environmental Information (OEI) Deputy Director R. Wynn also welcomed the group. She emphasized OEI's support for the e-Manifest concept, and described a number of drivers for electronic reporting efforts such as e-Manifest, including the 2002 Government Paperwork Elimination Act; the 2002 e-Gov initiative; and the increased document and tracking security, data quality, and timeliness that electronic reporting can enable, in addition to paperwork burden reduction.

OEI (R. Wynn) explained that EPA is increasingly supporting data exchange systems and briefly described the Agency's Central Data Exchange (CDX) and the National Environmental Information Exchange Network (NEIEN). CDX is EPA's central point of data collection and exchange with the Agency's stakeholders (private sector entities, federal facilities, state/local governments). CDX integrates receipt, security, translation, archiving and distribution functions, and provides a user-friendly uniform Web interface for submitting (reporting) data to EPA (http://www.epa.gov/cdx). The Exchange Network is an Internet- and standards-based network of information systems among EPA, and state and tribal governments. It reduces information collection and reporting burdens by enhancing electronic reporting capabilities. It also provides the ability to better integrate data from different sources.

OEI (R. Wynn) encouraged conference participants to visualize the opportunities that e-Manifest presents and to work to create a shared vision of a successful e-Manifest project that would leverage the common needs of RCRA stakeholders, by providing for appropriate uniform national centralization of some activities balanced by the flexibility that is necessary, given the diversity of entity types and sizes that use the RCRA Hazardous Waste manifest.

Both OSW (M. Hale) and OEI (R. Wynn) emphasized that the goal for the e-Manifest conference was to involve all stakeholders in determining the future direction (finalization) of the proposed e-Manifest, and to identify e-Manifest approaches that are beneficial, supportable, implementable, and affordable for all stakeholders, including EPA. They thanked participants for their time and efforts and mentioned that (conference) comments could also be submitted using EPA's e-Docket, at http://www.epa.gov/edocket, docket number RCRA-2001-0032.

1.2 Draft e-Manifest Roadmap Presentation

OSW e-Manifest Project Leader R. LaShier presented an overview of the Agency's current thinking about RCRA e-Manifest implementation options—the draft *e-Manifest Roadmap*. The Draft e-*Manifest Roadmap* presents a straw approach and high-level design for implementing a national e-Manifest system, which OSW prepared to use as a discussion document for the conference. The intent of the *e-Manifest Roadmap* is to:

- Chart an implementation plan and critical steps toward a feasible e-Manifest solution
- Provide an agenda and platform for the e-Manifest stakeholder meeting
- Facilitate stakeholder input and consensus building
- Serve as a guide for future discussions beyond the stakeholder meeting

Figure 1-1 presents our straw conceptual framework of the *e-Manifest Roadmap*, a layered services model.

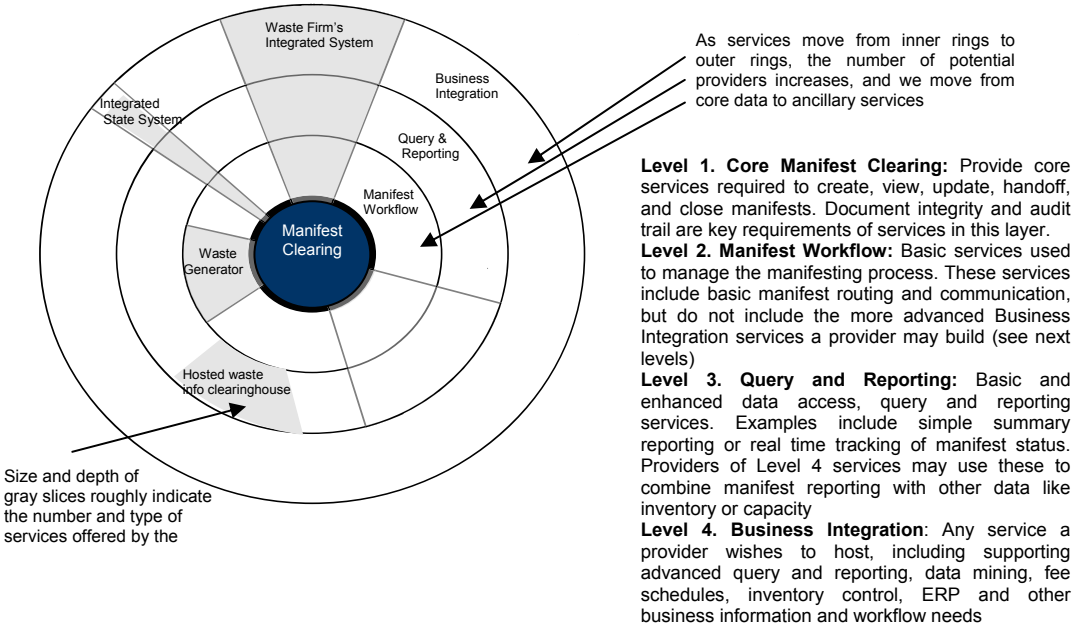


Figure 1-1. Layered Services Model

In the context of the layered services approach, the *e-Manifest Roadmap* also identifies issues and options related to funding, governance, technology, and business process.

Funding Approaches. The funding section identifies alternatives for funding the e-Manifest system build and for paying for future ongoing system operations (operations and maintenance [O&M]). Funding might take a single approach (i.e., use only one option), or most likely, a funding package might be developed by combining elements of a number of funding options. Funding options identified in the *e-Manifest Roadmap* include:

- User fees
- Share-in-savings (EPA- or private-sector funded)
- New appropriation to EPA
- EPA state grant programs
- Private sector sponsorships
- Nongovernmental organizations (NGOs)
- General Services Administration's (GSA's) Electronic Government (e-Gov) Fund

The funding view also identified possible impacts and future alternative arrangements for state government manifest fees. As of 2002, 29 state governments collect copies of final completed RCRA manifests, of which, about 11 states assess fees on RCRA manifests.

Governance View. This view outlines issues associated with who might make decisions about, and oversight of, design and operation of an e-Manifest system and how future changes (e.g., IT upgrades, and future modifications to manifest data elements) to a system might be managed. Some of the questions raised by the governance view include:

- What agreements and/or rules are needed to make users confident that a national e-Manifest system approach will work?
- How should these agreements or rules be developed? Who will maintain them?
- How should they be enforced and modified in the future?

Technical View. This view identifies issues and ideas related to the overall IT architecture and direction for data, security, infrastructure, and daily operation of an e-Manifest system. Discussions in the technical view include:

- *Architecture.* Basic structure of an e-Manifest solution and high-level design options for implementation.
- *Data.* Structuring, sharing, and managing e-Manifest data.
- *Security.* Keeping e-Manifest data and applications secure and private.
- *Infrastructure.* Getting online with the e-Manifest solution so all stakeholders have access.
- *Operations.* Management of the e-Manifest solution (e.g., hotlines, maintenance).

Business Process View. This view outlines how an e-Manifest system might practically work to provide an alternative for the paper manifest. Discussions in the business process view include:

- *Context View.* Key RCRA regulatory and business background related to manifesting.
- *Process View.* Key steps, information flows, and stakeholder roles throughout the life cycle of a manifest (i.e., generation initiation, transporter shipment, waste shipment, TSDF [treatment, storage, and disposal facility] receiving, state government submissions).

- *Information Requirements View.* Description of the information needed to fulfill RCRA regulatory reporting requirements, and to improve business operations related to manifesting and waste shipping.
- *Services View.* Key services offered by an e-Manifest solution, and how they interrelate (i.e., Level 1 core and ancillary services Levels 2, 3, and 4).

1.3 Group Discussion of the Draft e-Manifest Roadmap

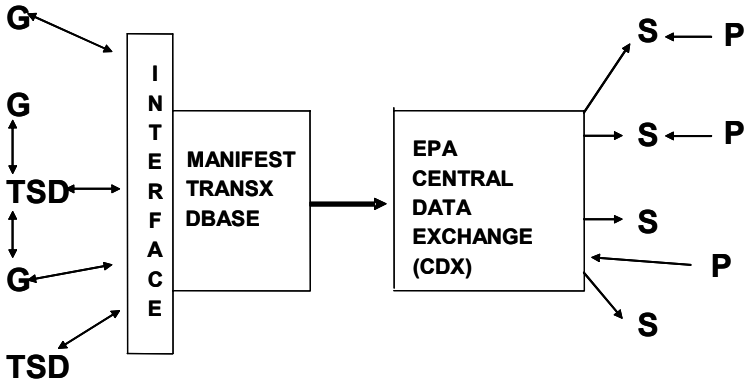
Following the presentation of the draft *e-Manifest Roadmap*, conference participants participated in a facilitated question and answer session. The purpose of the session was to develop group understanding about the *e-Manifest Roadmap*; identify and discuss alternatives; briefly describe the breakout group sessions; and identify the key questions and issues for the breakout sessions.

During this discussion, the conference participants identified several ideas and issues for further exploration in breakout sessions:

- The role of EPA's CDX in supporting a national e-Manifest system.
- Interest in an e-Manifest system that could integrate domestic and transboundary tracking data.
- The need to preserve the option of the paper manifest (EPA Form 8700-22) for hazardous waste generators who choose to use paper, and the need to preserve helpful functions from the paper manifest, such as generic waste profiling capabilities.
- The need to address any issues associated with data and signature security, regulatory enforcement, and compliance assurance.
- The need for an e-Manifest system to be a true reflection of physical chain-of-custody for waste shipments cradle-to-grave, and potential difficulties for transporters and small-quantity generators (SQGs) in participating in an e-Manifest system.
- Interest in how an e-Manifest system might support streamlining or electronic reporting of other data, such as RCRA hazardous waste biennial report (BR) shipment data.
- The need to coordinate with other agencies, such as the Customs Department and the Department of Transportation (DOT).
- Recognition that outreach and training would be an important part of successful nationwide adoption of any e-Manifest system.

During this discussion, Environmental Technology Council (ETC) (D. Case) presented an overview of ETC's ideas for an e-Manifest option (Figure 1-2). Like the shared services approach described in the *e-Manifest Roadmap*, the ETC approach would rely on a centralized interface and database for all e-Manifest transactions. Specifications for this interface and database would be developed by a standards setting group with stakeholder participation and oversight. ETC (D. Case) described that a key part of the ETC approach is that the e-Manifest interface would be designed and funded by private business, and overseen by a newly created, nonprofit organization (NPO), or a quasi-governmental board. This NPO or board would contract with IT service providers to manage and operate the interface. This would avoid stakeholder concerns that may be associated with EPA's ability to reliably operate, or timely fund, an e-Manifest system. Once created, e-Manifests would be filed with EPA for long-term storage, and EPA would be responsible for providing access to e-Manifest data from this storage

repository to states and other users. ETC (D. Case) explained that he would describe ETC's ideas about an e-Manifest system in more detail later in the conference (Day 2).



(G = generators; TSD = treatment, storage, and disposal; S = state governments; P= public)

Figure 1-2. ETC Approach

1.4 Lessons Learned from other Hazardous Waste Electronic Manifesting Systems

Ontario Ministry of the Environment (OME) (G. Rocoski) and Department of Defense (DOD) Defense Logistics Agency (DLA) (R. Smith) shared their experiences with the hazardous waste e-Manifesting systems to the conference.

OME (G. Rocoski) identified a number of issues that they encountered in implementing an e-Manifest system in 2003, to include the need to understand how the "old" paper manifest form meshes with the "new" electronic system; the need to conduct more consultation/discussion sessions with potential users of the system; and the need to do more outreach, education, and information transfer once the system became operational. He also identified a number of lessons learned including:

- The need to recognize that the protocols associated with paper systems are not automatically the protocols that are needed for an electronic system. He suggested asking question like:
  - Are we doing it this way because that's all paper allows, or is it what we really want?
  - What critical pieces of information may we be missing?
  - What's needed versus what's nice to have?
- The opportunity to apply concepts from other Web sites (e.g., Internet banking).
- The need for flexibility in regulatory language to allow more options in system design.
- The need for an electronic system to provide time-savings compared to a paper system—the time it takes to access and use an electronic system is competing with time it takes to sign a paper manifest.

DOD DLA (R. Smith) described the DLA's experience with electronic tracking of hazardous materials. The DLA has a very successful electronic materials tracking program that has been highly accepted and utilized by their customers at various defense outposts. He emphasized that the DLA electronic system has resulted in higher quality data and significant cost savings,

including savings that are not directly related to manifest processing, such as considerable savings associated with preparation of responses to information requests under the Comprehensive Environmental Response and Liability Act (CERLA).

He described a number of DLA lessons learned in designing their system. These include:

- Recognition that multiple methods of transmittal are better than one method. DLA provides for both XML transaction sets and capability to securely load data directly into Web-enabled database.
- Verification of file transfer is paramount. DOD DLA (R. Smith) emphasized that the system cannot have lost files; file edit must be on each manifest line to prevent an error on one line from delaying transmittal of the entire file; and "due in" and "discrepancy" reports are needed.
- Incentives for implementation help—if there were e-Manifesting, what paper documents or reports would no longer be needed? What data might an e-Manifest system provide back to users?

He also made a number of recommendations based on DLA's experience, including:

- Avoid third party processing of files, value-added networks (VANs) provided little value.
- Identify reasonable timeframes for modifying existing systems (phase-in).
- Identify all possible data elements up front, it is easier and less expensive to identify and add potential file data elements now, than perform systems changes to add later. And, to this end, consider including non-RCRA data elements as an option.
- Include ability to simplify and electronically generate materials for other RCRA recordkeeping and reporting requirements, such as the RCRA BR.

1.5 Breakout Sessions: Understand Issues and Questions

Following the lessons learned panel discussion, participants attended one of three breakout sessions: (1) business process, opportunities and governance; (2) technology architecture; and (3) funding. Breakout sessions allowed conference participations to "drill down" into some of the key concerns, questions, and major issues associated with an e-Manifest system (e.g., who will design, implement, manage, maintain, modify, certify, and approve e-Manifests). At the end of the sessions, each group reported briefly on their discussion to the full conference participants. Summaries of the breakout group discussions are provided below.

1.5.1 Business Process, Opportunities, and Governance Breakout Group

The business process, opportunities, and governance breakout group focused on how to use the e-Manifest to address current information and process requirements, as well as new opportunities (potential roles and functions) that may be created by a national e-Manifest system and should, therefore, be factored into thinking about the system design, operation, and funding. This group also discussed how an e-Manifest system might be administered and the role of EPA in administering such a system.

On the first day, this group focused on further describing the business process associated with manifesting and identifying a number of areas of convergence, and issues associated with providing a viable electronic substitution for the paper manifest.

With respect to describing the business process, the breakout group emphasized that an e-Manifest system would have to provide for the full range of regulatory and business process activities, which often are more complicated than just a straightforward shipment of waste from one generator, to one receiving facility, using one transporter. Complexities may include international shipments; multiple transporters; transfer and "10-day" facilities; shipment bulking; discrepancies, and whole or partial shipment rejection by a receiving facility. However, the group also recognized a number of key drivers for development and adoption of an e-Manifest system. These included potential paperwork burden cost savings; easing or streamlining of regulatory reporting or elimination of duplicative reporting systems, improvements in initial data quality through automatic data checking; and the ability to correct data entry errors faster and more transparently.

The group was particularly interested in the potential for e-Manifest to improve initial data quality through a system of data validation. With the paper manifest system, an incorrectly typed EPA identification number, or waste code, may take months to track down and correct. With an electronic system, one could design an automatic check of an entered facility identification number against the database of all EPA identification numbers for instant data verification or correction.

In the context of discussions of reporting, OSW (D. Levy) briefly described a potential system to streamline the RCRA hazardous waste BR report to the group. The group recognized that, if an e-Manifest system captured all the data fields from the upcoming uniform hazardous waste manifest form final rule, it would have all the data necessary to produce BRs for wastes shipped off site except for waste source code data. OSW (D. Levy) is exploring a new approach to biennial reporting that might use data from an e-Manifest system to streamline reporting requirements.

The group recognized that e-Manifest might enable many additional types of electronic reporting and other data functionality, and perceived these possibilities as one of the drivers for an e-Manifest system. However, at the same time, the group strongly converged around the idea that any e-Manifest system, particularly a system built or operated by the government, should be as simple as possible, and should begin with only the core data elements and functionality that were necessary to provide a viable substitute for the paper manifest. While an e-Manifest system should enable other business functionality or reporting, identification and development of this functionality should be left to private industry and markets.

In addition to their strong convergence around the idea of keeping an e-Manifest system as simple as possible, the business process and governance breakout group also converged around the idea that an e-Manifest system should:

- Operate with a central database or data warehouse for archiving and accessing e-Manifest data.
- Use a data interface to provide for "in process" manifests, and to push (upload) data into the central database or warehouse.
- Be built around standard data elements and a standard data schema, using the data fields from the upcoming uniform hazardous waste manifest form final rule, so that it would be simple to push (upload) data into the central database.
- Use data and signature security approaches that would function in the real world, and ensure that an e-Manifest is a viable and time-saving substitute for paper.

The group discussed the notion of "real-time" reporting and felt that it was important to clarify that when used in the context of e-Manifest, "real-time" reporting does not mean "real-time tracking", such as the tracking available for package shipments by Federal Express and other shippers. The group emphasized that they do not believe that real-time tracking to be feasible.

Rather, in the context of e-Manifest, real-time reporting means that data on waste shipments will be available faster than it currently is (30 days), potentially within a few days. The group discussed when data from "in process" manifests should be tracked and made available, and identified three points for where data tracking is particularly important:

- When a shipment is tendered by a generator.
- When a shipment is accepted (or rejected) by a receiving facility.
- When manifest discrepancies are encountered.

1.5.2 Technology Architecture Breakout Group

The technology architecture breakout group discussed the technical aspects of different e-Manifest system approaches (i.e., software and hardware architectures) and explored five main IT systems:

- Data - Key assumptions, questions, and issues to be resolved related to manifest data (e.g., data input, transfer, output, storage, and archive).
- Services - Key components of the IT application architecture, and how they interrelate (i.e., interoperability), as well as defining potential discrete transactions that comprise the entire process.
- Security - How manifest data and IT applications will be kept secure.
- Infrastructure - Key hardware and software components required to implement an e-Manifest.
- Operations - How data and IT applications will be managed (i.e., maintained, updated).

The group discussed the need for an e-Manifest system to be flexible and have the ability to integrate with new and existing technologies. This included the e-Manifest system design incorporating a role for existing state government information systems, as well as the manifest fee revenue generating aspects of current state manifest business processes. Close coordination and scrutiny of all aspects of the e-Manifest proposal relative to the upcoming EPA Cross Media Electronic Reporting and Record-keeping Rule (CROMERRR) was also important. In order for the e-Manifest system to work with existing industry systems, it needs clear performance-oriented standards and specifications, standard formats, and extensibility (e.g., support for add-on services). The e-Manifest should also not compete with services and uses that the private sector wants to provide. Although not explicitly critical for interoperability, if the e-Manifest system does not clearly offer paperwork burden reduction to stakeholders, industry and other stakeholders are not likely to utilize, or integrate legacy IT systems with, the e-Manifest system.

A key issue for a successful e-Manifest is ensuring that the system will work for the varied state (government hazardous waste) manifest programs. States utilize different business models and fee structures to issue and process manifests. As previously mentioned, states collect fees on manifest in a number of different ways. Also, any e-Manifest system will have to be enforceable in state courts with the ability to audit "what happened" at each stage of the manifest process. The group also identified a number of specific interests beyond traditional environmental management that the e-Manifest solution will have to address including state (and federal) emergency management, emergency response organizations, and transportation (e.g., cross-state shipment tracking).

Any version of an e-Manifest solution will have to plan for several years of concurrent continued use of "paper" manifests. This creates an additional level of complexity to the e-Manifest system design. The e-Manifest system will need to have a mechanism for all paper manifests to

eventually be incorporated into the common repository of "official" manifest records. Without this, functions such as making it easier to generate the BR from the e-Manifest system cannot be accomplished. In addition, the e-Manifest system will issue a unique identification number for each manifest, and this will have to be coordinated with the numbering on the paper forms.

States, EPA, and private industry all identified the importance of "trust" as a key component of a successful e-Manifest system. From the state perspective, private sector interests should not conflict with the core operational integrity of the system. In addition, the system should have clear business rules, tracking, restrictions on changes to data/manifests, audit chain, and rigorous quality assurance and data integrity checks. For EPA, the key "trust" issue was the enforceability of the signature (proof of identity) and an independent third party validation of the system. Private industry interest listed transparency (e.g., the entire operating system is known, who its partners are, and that there are no conflicts of interest); stability; and clear, open, non-proprietary, vendor neutral standards as key to trust. In addition, the system needs a credible method for positive confirmation that the data that was sent was received and accepted.

1.5.3 Funding Breakout Group

EPA will not be able to move forward with an e-Manifest system that involves the Agency developing and hosting new applications or systems unless a stable source of funding is identified for the entire life cycle of such a system. During the breakout sessions, the groups discussed their reaction to the overall e-Manifest approach, identified the funding implications of different alternatives, and described the challenges that they see to a successful e-Manifest system. On the first day of the breakout sessions the group discussed the pros and cons of the GSA-sponsored share-in-savings (SIS) approach as well as began preliminary discussion of other possible funding mechanisms (user fees, new federal appropriations earmarked for system development, and the possible reallocation/earmarking of EPA state grants).

GSA Office of Governmentwide Policy, SIS Program Office (K. Buck) gave an overview of the SIS funding tool. He identified the criteria for SIS use by an agency as clear baseline cost data; a large potential benefit cost-savings pool; enough funding to cover potential termination costs; a high level of support within the sponsoring agency; and high return on investment. In addition, he presented data from a project utilizing the SIS business case decision e-tool, and summarized additional information offerings including a proposal evaluation tool and case studies (additional information available at www.gsa.gov/shareinsavings). After this presentation, the group discussed the potential difficulties of using the SIS approach in e-Manifest's diverse multi-stakeholder business environment. Most difficult is the fact that the federal government (as federal facility generators of RCRA hazardous wastes) has only a small portion of the potential national cost savings pool, as compared to private industry. Additional discussion and analysis of SIS is needed to determine if a broader range of e-Manifest partners could benefit from the SIS approach.

The pros/cons and specific comments related to a variety of funding options (including SIS) were captured during the remainder of the breakout session and has been recreated in Table 1-1. Of all of the funding options reviewed, user fees were thought to be the main solution for funding an e-Manifest system. User fees will require new congressional authority for EPA to implement, but should be acceptable as long as they are implemented in a transparent way, and used directly for the e-Manifest system.

In addition to this variety of possible funding options, OSW (M. Eads) indicated to the group that any e-Manifest funding approach involving federal funding, would have to conform to the economic analysis requirements of OMB's Circular A-11 IT project "business case" framework.

Table 1-1. Funding Options Pros and Cons

Funding Option	Pros	Cons	Comments
SIS	Applies well to relatively small number of federal facilities that could significantly benefit from burden reduction potential of an e-Manifest	Must negotiate with thousands of stakeholders	• Need hard dollar cost estimates • Need fee structure • Need clear business case • Can we show cost reduction/benefit? • How can all stakeholders use the SIS option?
User Fees	Seems to fit solution. Strong funding option	There will be administrative costs to collect fees. No existing congressional authority to implement	• Need to have dedicated and transparent expenditures (money goes toward the system development/maintenance) • Perception issue with terminology 'user fees' - may want to change the name to 'Service Fee' • Revenue from user fees will start small, and grow as users come on-line, however start-up cost will be relatively large
EPA Appropriation	Good option; benefits all stakeholders	Seems unlikely in current federal budget climate	• Should be planning now for a possible FY07 appropriation • Good source of funding to assist states with system development and/or integration with e-Manifest
GSA e-Gov Funds	Good option	Currently under-funded	• May only apply to a small part of the solution
EPA State Grants	Good option, benefits many stakeholders	Potentially non-sustainable for the life of the system	• Will need to be focused on ensuring stakeholder readiness (especially states)
Venture Capital	Good option	Will only fund the non-governmental components of the system. May tie the project to another set of funding source approvals	• Will need a business case based on a known system model

1.6 Day One Wrap Up

After each of the breakout groups made their verbal reports tot eh reassembled conference participants, OSW e-Manifest Project Leader (R. LaShier) wrapped up the day's activities, and identified a number of common points, or areas of convergence, that seemed to be emerging from the Day 1 discussions:

- Stakeholders want a successful e-Manifest system. There are strong drivers for such a system including paperwork burden cost savings, efficiency, better initial data quality, faster and easier data corrections, and opportunities to leverage e-Manifest to streamline other reporting requirements and business opportunities.
- e-Manifest will be optional - generators can choose paper.
- Support is emerging for the idea of a single source for key manifest functions, for one centralized e-Manifest system.

OSW (R. LaShier) thanked the participants for their work, and asked that they consider these potential areas of convergence and return the next day ready to ratify, build upon, or revise them as necessary.

Section 2. Day Two—May 20, 2004

2.1 Panel Discussions: Current Needs and Future Visions for Electronic Manifesting

The day began with a panel of individuals who discussed current needs and potential future visions for RCRA Hazardous Waste e-Manifesting. The panel was comprised of:

- Safety-Kleen (M. Fusco), described Safety-Kleen's existing electronic tracking system for hazardous wastes.
- Environmental Technology Council (D. Case), offered additional detail on the idea he described on the first day—partial private funding/operation of an e-Manifest system.
- Michigan Department of Environmental Quality (E. Bols), described Michigan's existing e-Manifesting system for hazardous wastes.
- Northey-Smith (G. Miller), described efforts under way in the European Union to create a value added electronic tracking system for hazardous materials, including hazardous wastes.
- Computer Sciences Corporation (CSC) (D. Munyan), described some of the current uses and potential applications of Radio Frequency Identification (RFID) technologies to materials shipping.

The panelists' presentations have been posted on the conference e-Manifest Web site (www.epa.gov/epaoswer/hazwaste/gener/manifest/e-man.htm).

2.2 Breakout Sessions: Discuss Solutions and Path Forward

After the panel presentations, the full group again split into three breakout sessions to (1) discuss business process, opportunities, and governance; (2) technology architecture; and (3) funding issues. Each breakout group discussed the following questions:

- What do we agree on? (convergence)
- What we still have to solve? (issues)
- What should be the next steps?

Breakout groups took up the rest of the morning into the lunch hour. After lunch, the full group met again to discuss the results of the breakout group sessions.

2.3 Areas of Convergence

After reconvening, the full group recognized a number of important cross-cutting areas of convergence.

- There is a high degree of stakeholder support for e-Manifest. Conference participants agreed that an e-Manifest system is "do-able" and desirable. Key drivers behind an e-Manifest include paperwork burden reduction cost savings and efficiency; better initial data quality; and the ability to make faster, easier, manifest data corrections.
- The full group also recognized that e-Manifest will, and should be optional. Because generators can choose to continue to use paper manifests, design of any electronic

system must acknowledge that some use of paper manifests will continue into the future.

- Finalization of the uniform manifest form rule (in the last stages of EPA review as of May 2004) is a very important step towards realization of an e-Manifest system—the rule should be finalized by EPA and OMB quickly.
- An e-Manifest system should use single sources for certain "key" functions. Two functions were identified and discussed at length: Manifest clearing/processing (temporarily named *FOO* to facilitate easy verbal reference to this approach during the conference); and official governmental acceptance and reposting of manifests, as depicted in Figure 2-1 below:

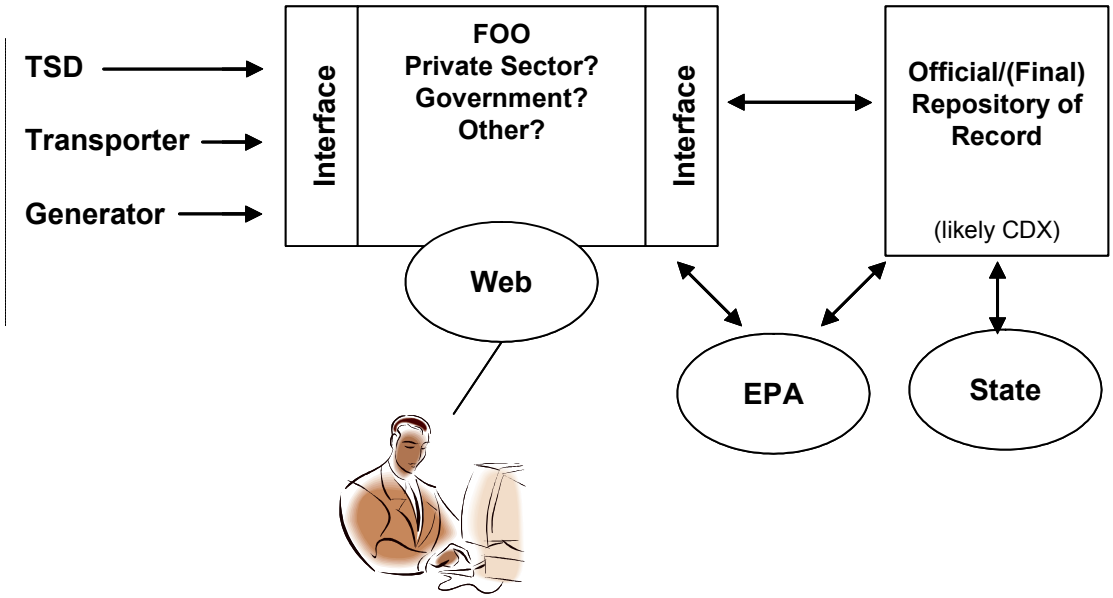


Figure 2-1. FOO Approach

- The full group emphasized that there are many ways to implement this framework, including many design options, many funding options, and many options for who would build and govern FOO and how it would interact with both state and federal governments. These include options for government-based system building and design, private system building and design, or a combination. In particular, the group discussed an approach where the e-Manifest interface (FOO in the diagram above) might be designed, funded, and operated by a private consortium or consortia in consultation with government (government determines what constitutes a valid manifest transaction, performance standards for components, and auditing requirements) and the repository might be designed, funded, and operated by government, potentially using EPA's CDX. As part of discussion of this issue, EPA OIC (C. Dwyer), indicated that based on discussions at the stakeholder conference, the requirements of an e-Manifest system repository (or an entire e-Manifest system) seem to be similar to other systems that CDX is currently operating for other EPA programs.
- The full group emphasized that a central service provider, whether it be government or private, or a combination, must be reliable and trusted if an e-Manifest system is to be successful. The group identified the following desirable characteristics of a central service provider: stability, trust, transparency (open standards), independent testing and

auditing, standards for users to ensure quality, and a quality assurance and quality control program. The group discussed in particular the idea that data standards and interfaces should be non-proprietary and vendor neutral.

- The full group also identified the minimum key functions that are necessary for an e-Manifest system to provide a viable alternative to paper manifests.
  - Get a registered manifest with a unique identification number.
  - Fill in needed data, potentially accessing existing systems to verify/correct data, such as facility identification numbers. The group agreed that the data needed should be the data called for in the upcoming uniform hazardous waste manifest form final rule.
  - Sign/certify manifest for generators and receiving facilities. The group also recognized that transporters would need a way to certify that they had accepted custody of a waste shipment; however, there are issues associated with the manner in which transporters might make this certification.
    - Change manifest to make corrections in an auditable (traceable) fashion.
    - Identify/record waste shipment discrepancies on the manifest.
    - Store and provide access to manifest data, including secure copies of all manifest "pages."
- The full group also recognized that an e-Manifesting system has to work for everyone. The full group discussed a number of key customers and their requirements for an e-Manifest system:
  - All current stakeholders with "big legacy IT systems" will need to be able to pull (download) and push (upload) data into an e-Manifest system, using a standard interface and process.
  - Solution providers: e-Manifest must be adaptable to allow for future new technologies (e.g., for data collection or signature) to be implemented, and new services provided.
  - State agencies may have issues associated with collection of state user fees and state reporting.
  - RCRA regulatory compliance and enforcement personnel, who need to be assured that manifest data are secure and non-reputable, and need access to data.
  - Generators, transporters, and TSDFs, that have real world daily business operational imperatives—an e-Manifest system must be practical and work in the real word and must meet real world operational timeframes.
- Any e-Manifest system must successfully address issues associated with data and signature security, this includes the ability to assure data integrity over time; to provide for an audit trail to document tracking of any changes to an e-Manifest; and to show who made the changes and when (traceability). The group was confident that data and signature security could be successfully addressed.
- A successful e-Manifest system has the potential to support many other reporting improvements—the example most often discussed was the potential to support electronic cogeneration of the RCRA biennial hazardous waste report.
- The full group understood that just as there is a paperwork burden cost associated with the paper manifest system, there will be a cost associated with an e-Manifest system.

The group did not universally support "user fees", but participants did converge around the idea of appropriate "fees for services".

- Cost should not be a barrier to successful development of an e-Manifest system, because the system would be able to show a clear business benefit compared to the current paper process. This business benefit should provide a strong impetus for investment from both public and private interests.
- The full group recognized that all of the funding options discussed, and combinations of these options, could have a role in creating a successful e-Manifest system.

2.4 Issues

In addition to the areas of convergence related to the design, operation, and funding of an e-Manifest system, the full group identified a number of remaining issues that require additional thought or research as part of moving forward with e-Manifest.

- The extent to which an e-Manifest system should also address Toxic Substances Control Act (TSCA) and other wastes that have similar shipping requirements.
- The need to coordinate with the Customs Service and with the DOT in any e-Manifesting project.
- The need to resolve the way that transporters and SQGs might participate in an e-Manifest system, and to clarify the relationship between e-Manifest and DOT shipping requirements. One approach the group discussed was that generators and receiving facilities might create and sign/certify a manifest electronically, but that a paper copy of this electronic document would be printed for use by transporters and to fulfill DOT shipping requirements.
- The need to deal with issues that may be associated with bulk shipments and transfer facilities and other potential complexities associated with individual waste shipments.

2.5 Possible Next Steps

The full group identified a number of possible next steps to further the e-Manifest concept.

- A more detailed description of the key functions required. This product should focus on *what* a successful e-Manifest system must do (system functionality), rather than on *who* should build or operate it. These descriptions would also allow for creation of cost estimates and business case. This more detailed system description should be developed in further consultation with stakeholders.
- Continued work is needed to build a coalition of stakeholders to support e-Manifest and resolve the issues identified above. This should include providing additional information about e-Manifest options to a wider cross-section of stakeholders, including all state environmental agencies not represented at the conference. Additional information should include, in particular, information on the public/private option discussed by the stakeholders in response to the ETC presentation. On balance, the group was most interested in a system, such as the FOO system diagramed above, that allows for a combination of public and private funding and operation for e-Manifest.
- Cost estimates are needed to support development of an OMB Circular A-11 business case, and for a funding analysis. This should include additional exploration of implications of a share-in-savings funding option for all stakeholders and exploration of the costs of updates and maintenance for various e-Manifest approaches.

- Design and implementation of an e-Manifest system should include a partial initial phase-in, as appropriate, developed by system designers. However, any project phasing should be carefully considered, so as to avoid the unintended consequence of the "partial system forever trap".

2.6 Conference Wrap Up

OSW (R. LaShier) wrapped up the conference activities. He explained that the broad areas of convergence identified by the fullgroup would give EPA a lot to work with as they move forward in their consideration and planning formulation of an e-Manifest system. In particular, he recognized the broad stakeholder support for e-Manifest and the opportunities it provides; support for a centralized system to provide core manifest services or functionality; and the identification of a potential "hybrid" option. In the hybrid option, a non-governmental group might take a secondary role in developing and operating the e-Manifest interface, while EPA might take a lead role in developing and operating an e-Manifest data repository using the CDX. He recognized the fullgroup's belief that, because of the many potential solutions available, data and signature security issues, and funding issues should not be a barrier to implementing e-Manifest.

He assured participants that EPA would carefully consider the ideas and input from the e-Manifest conference in moving forward with the e-Manifest project; and explained that under the current schedule, EPA management will be briefed on the results of the conference and options for proceeding with the *e-Manifest Roadmap* in July 2004.

Over the summer, EPA will continue to work with stakeholders further to develop ideas about e-Manifest and to identify the regulatory steps in moving forward. Currently, it is anticipated that these steps will include a review of the 2001 e-Manifest proposal to determine if a supplemental notice of data availability (NODA) should be issued to provide for additional stakeholder input on the e-Manifest concept. In September 2004, EPA will make decisions about its FY05 activities with respect to e-Manifest. These activities might include finalization of all, or part of, an e-Manifest rule based on the 2001 proposal; publication of a supplemental data notice; additional formal and informal work with stakeholders; development of guidance or other documents to support e-Manifest, or re-proposal of an e-Manifest rule. He also indicated that proceedings of the e-Manifest conference, including copies of all presentations, would be made available and posted on the e-Manifest conference Web site (www.epa.gov/epaoswer/hazwaste/gener/manifest/e-man.htm).

OSW (R. LaShier) emphasized that stakeholder participation would continue to be very important in helping the Agency develop a successful, fundable approach to e-Manifest. If stakeholders could continue to come together, as they did during this conference, around a broadly shared vision for a national e-Manifest system and a feasible funding approach, the Agency will likely be able to move expeditiously forward. Without continued stakeholder support, and without a feasible funding approach, a centralized national e-Manifest system is not likely. He encouraged participants to stay involved in the e-Manifest project, and asked all to continue to work with EPA to make e-Manifesting a near-term reality.

Appendix A. e-Manifest Stakeholder Conference Agenda and Materials

e-Manifest Stakeholder Meeting
May 19-20, 2004
EPA East Building, Public Hearing Room 1153
1201 Constitution Ave. NW, Washington, D.C.

Meeting Objectives

- Present and receive stakeholder input on the *working-draft e-Manifest Roadmap*.
- Understand the lessons learned from other electronic manifesting projects.
- In small groups, identify and work through issues associated with creating a successful e-Manifest approach, including balancing consistency with flexibility, ensuring system security and usability, and addressing cost and funding.
- Describe streamlining and other opportunities that might be created by an e-Manifest system.

Day One—May 19, 2004

8:30 Registration

9:00 Opening plenary – welcome and orientation (30 minutes)
- › Matt Hale, Deputy Director, Office of Solid Waste, OSWER
- › Renee Wynn, Deputy Director, Office of Information Collection, OEI (www.epa.gov/link to Renee's presentation)

9:30 The draft e-Manifest roadmap (1 hour)
- › Rich LaShier, Office of Solid Waste (www.epa.gov/link to presentation)

10:30 Morning break (15 minutes)

10:45 Group discussion of the draft e-Manifest roadmap (1½ hours)
- › Develop group understanding about the road map
- › Identification and discussion of alternatives
- › Briefly describe the breakout group process:
  - − Business process, opportunities and governance
  - − Technology architecture
  - − Funding
- › Identify key questions and issues for three breakout groups:
  - − Reaction to the overall e-Manifest approach
  - − Pros and cons of alternatives
  - − Challenges to e-Manifest

- Strategies and partners to overcome these challenges
- Other options to consider or opportunities that might be realized

12:15 Lunch (on your own) (1¼ hours)

1:30 Lessons learned from other electronic manifesting systems (1 hour)
- › George Rocoski, Ontario Ministry of the Environment (www.epa.gov/link to presentation)
- › Randy Smith, DOD Defense Logistics Agency (www.epa.gov/link to presentation)

2:30 Afternoon break (15 minutes)

2:45 Breakout groups – understand issues and questions (1½ hours)
- › Business process, opportunities and governance
- › Technology architecture
- › Funding

4:15 Wrap up Day 1 and plan for Day 2 (45 minutes)

5:00 Adjourn

Day Two—May 20, 2004

8:30 Panel: current needs and future visions for electronic manifesting (1¾ hours)
- › Mike Fusco, Safety-Kleen (www.epa.gov/link to presentation)
- › David Case, Environmental Technology Council (www.epa.gov/link to presentation)
- › Liz Bols, Michigan Department of Environmental Quality (www.epa.gov/link to presentation)
- › Glenn Miller, Northey-Smith (www.epa.gov/link to presentation)
- › Dan Munyan, CSC (www.epa.gov/link to presentation)

10:15 Morning break (15 minutes)

10:30 Breakout sessions – discuss solutions and path forward (1½ hours)
- › Business process, opportunities, and governance
- › Technology architecture
- › Funding

12:00 Lunch (on your own) (1¼ hours)

1:15 Report on business process, opportunities and governance group discussion (45 minutes)
- › Reaction to the overall e-Manifest approach and alternatives

- › Pros and cons of alternatives
- › Challenges to e-Manifest
- › Strategies and partners to overcome these challenges
- › Other options to consider or opportunities that might be realized

2:00 Report on technology architecture group discussion (1 hour)
- › See topics above

3:00 Afternoon break (15 minutes)

3:15 Report on funding group discussion (1 hour)
- › See topics above

4:15 Wrap up and next steps (45 minutes)

5:00 Adjourn

Background Information and Breakout Sessions

Breakout (or small group) sessions will be used so that meeting participations can "drill down" into some of the key issues, questions, and major issues associated with who will design, implement, manage, maintain, modify, certify, and approve e-Manifest system IT software, hardware, guidance, administrative processes, modifications, upgrades, interfaces, and technical formats.

For purposes of this meeting, EPA has identified a number of potential approaches to developing and implementing an e-Manifest system, including centralized, distributed, and shared services models.

Under a *"Centralized Services"* approach, all services are hosted on a primary network location. Mission-critical data is located at the primary location.

Under a *"Distributed Services"* approach, private firms would develop e-Manifest systems that adhere to a set of promulgated standards. Services and data, regardless of type, may be hosted by any network partner.

Under a *"Shared Services"* system, manifest handling services and manifest 'documents' would be hosted on a primary network location. All other services and data may be hosted by any network partner wishing to participate.

Of the three, it seems that the *Shared Services* approach best addresses the stakeholder comments received thus far, offers robust security for non-repudiation, and provides an opportunity for value-added development of additional services by network partners.

EPA wishes to thoroughly vet this proposal with stakeholders, both as a group and in focused small group breakouts, as described below:

Business Process, Opportunities, and Governance

EPA anticipates that the business process, opportunities, and governance breakout group will focus on how to use the e-Manifest to address current information and process requirements, as well as new opportunities (potential roles and functions) that may be created by an e-Manifest and should, therefore, be factored into thinking about the system design, operation, and funding. For example, an e-Manifest might be able to:

- Serve as a mechanism for consolidating a number of functions currently performed by hazardous waste generators, transporters, TSDFs, state regulators, enforcement personnel, and federal regulators.
- Consolidate reporting requirements for the RCRA Biennial Report and other data programs.
- Allow for integrated reporting and faster data collection and analysis.

This group will also discuss how an e-Manifest system might be administered and the role of EPA in administering such a system.

Information Technology Architecture

The information technology architecture breakout group will focus on technical aspects of different e-Manifest system approaches (i.e., software and hardware architectures) and explore the four main IT systems:

- *Data subsystem:* key assumptions, questions, and issues to be resolved related to manifest data (e.g., input, transfer, output, storage, and archive).

- *Services subsystem:* key components of the IT application architecture and how they interrelate (i.e., interoperability), as well as defining potential discrete transactions that comprise the entire process.
- *Data security subsystem:* how manifest data and IT applications will be kept secure.
- *Infrastructure subsystem:* how data and IT applications will be managed (maintained, updated).

Funding

EPA will not be able to move forward with a "shared services" or other approach that involves the Agency developing and hosting new applications or systems unless a stable source of funding is identified for the entire life cycle of such a system. The funding breakout group will focus on evaluating a number of possible funding mechanisms, such as:

- User fees
- Share-in-savings and other cost-recovery contracts
- New federal appropriations earmarked for system development
- Reallocation/earmarking of EPA state grants

Abbreviations and Acronyms

BR	biennial report
CDX	Central Data Exchange
CERLA	Comprehensive Environmental Response and Liability Act
CROMERRR	Cross Media Electronic Reporting and Record-keeping Rule
CSC	Computer Sciences Corporation
DLA	Defense Logistics Agency
DOD	Department of Defense
DOT	Department of Transportation
e-Gov	electronic government
EPA	U.S. Environmental Protection Agency
ETC	Environmental Technology Council
GSA	General Services Administration
NEIEN	National Environmental Information Exchange Network
NGO	nongovernmental organization
NODA	notice of data availability
NPO	nonprofit organization
O&M	operations and maintenance
OEI	Office of Environmental Information
OIC	Office of Information Collection
OMB	Office of Management and Budget
OME	Ontario Ministry of Environment
OSW	Office of Solid Waste
RCRA	Resource Conservation and Recovery Act
RFID	radio frequency identification
SIS	share-in-savings
SQG	small-quantity generators
TSCA	Toxic Substances Control Act
TSDF	transport, storage, and disposal facility
VAN	value-added network